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Of

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On

IMPROVED DRYWALL JOINT CONSTRUCTION AND METHOD

Sheets of Drawings: five (5)

TITLE: Improved Drywall Joint Construction and Method

BACKGROUND OF THE INVENTION

INCORPORATION BY REFERENCE:

Applicant hereby incorporates herein by reference any and all U. S. patents and U.S. patent applications cited or referred to in this application.

FIELD OF THE INVENTION:

This invention relates generally to interior drywall, and more particularly to drywall joint constructions and methods.

DESCRIPTION OF RELATED ART:

In the interior drywall field, the conventional drywall joint is formed between drywall boards having tapered abutting edges so as to form an outwardly-facing recess along the joint that must be filled in. Conventional joint cement compound for filling the recess is formulated to be soft for easy sanding when finishing the joint. Unfortunately, as a result of this formulation, the typical conventional joint cement compound has little cohesion or adhesion to the underlying drywall boards, is weak and brittle, and is prone to cracking upon expansion or contraction of the drywall joint. Repair of such failed joints can be costly, particularly after the interior is completed and the building occupied.

Beyond these concerns relating to the structural integrity of the conventional drywall joint, the use of conventional joint cement compound also presents aesthetic problems for the finished joint, including the common problem of surface cracking. Because the joint cement is, again, soft and weak, when joint cement is at the surface of a drywall joint directly over

the recess or crack between abutting drywall boards, center-line cracking along the recess often occurs as the joint is stressed and the drywall boards move relative to one another. Further, the conventional joint cement compound at the surface of the drywall joint also tends to absorb too much paint so as to leave different sheens on the wall or ceiling, commonly referred to in the art as flashing or photographing, and even allows for delamination between the drywall board, texture and paint.

Once a first coat of conventional joint cement compound is applied to the recess in the drywall joint, the typical drywall joint is completed by applying drywall tape or paper along the joint and then applying two top coats of conventional joint cement compound over the tape to flush the joint with the abutting drywall boards. Beyond the structural and aesthetic short-comings of this typical drywall joint, as explained previously, this joint finishing process creates other logistical and economic problems as well. First, the thick coats of conventional joint cement compound must be allowed to dry before the joint can be completed, requiring multiple trips to the work-site. And second, the number of coats of conventional joint cement compound adds further cost to the finished drywall joint both in terms of materials and labor.

The following art defines the present state of this field:

U.S. Patent No. 2,323,963 to Ames is directed to a combined plastic and tape applicator which will combine the steps of applying plastic in the groove between adjacent wallboards and covering the plastic with tape for reinforcing purposes by first coating the tape with plastic and then applying it to the joint between two adjacent wallboard sections. This method of application not only combines two of the steps into one, but provides a more even distribution of the plastic that lies between the tape and the wallboard, thus increasing the adhesive contact between the plastic and the wallboard and thereby strengthening the entire joint.

U.S. Patent No. 3,180,058 to Tillisch et al. is directed to a joint structure for plasterboard wherein there is provided plasterboard having a plurality of shallow, discontinuous indentations in multiple rows in at least one surface adjacent the edge thereof, and adapted to retain joint cement applied to such surface to insure a joint which is satisfactory and of pleasing appearance.

U.S. Patent No. 3,708,935 to Kossuth et al. is directed to a predecorated wallboard for forming simulated monolithic predecorated wall construction composed of an elongated rectangular core panel including a set gypsum core enclosed on its two opposite sides and two longitudinal edges with a paper facing layer and having on its front side a flat central surface arranged between recessed marginal surfaces extending from the flat surface to the opposite longitudinal edges of the panel and tapering edgewise toward the rear side of the panel, and a decorative sheet including a cloth backing layer laminated only to the flat surface of the paper facing layer on the front side of the panel throughout the length of such front side and an outer polyvinyl chloride layer forming a decorative front wall surface, such sheet also including a narrower flap extending over one of the marginal surfaces but terminating flush with the adjacent longitudinal edge of the panel and a wider flap extending over the opposite marginal surface beyond the opposite longitudinal edge of the panel. Each wallboard is adapted to form a joint with an adjacent wallboard, such as a flat joint wherein the adjacent longitudinal edges of the panels are arranged in abutting relationship and the front sides thereof are flush, with the adjacent marginal surfaces thereof forming beneath adjacent narrower and wider flaps a shallow V-shaped recess or space to be filled to the level of the flat surfaces of the panels with a hardened joint cement layer to which the narrower and wider flaps are adhered as well as to each other in overlapping relationship over the marginal surface underlying the narrower flap, the joint being completed by cutting through the overlapping portions of both flaps, by removing the overlapping and overlapped marginal edge portions of the overlying and underlying flaps respectively to cause the narrow flap to terminate short of the adjacent longitudinal edge of the underlying panel, and

by readhering the remainder of the overlying flap to cause the wider flap to extend into edge abutting and flush relationship with the narrower flap to form a practically invisible seam.

U.S. Patent No. 4,122,222 to Parker is directed to a method and a preformed laminate useful in various forms for repairing holes and covering joints in drywall. The laminate comprises a sheet material backing having an overlay of plaster joint compound, or the like. The overlay has an outwardly tapered thickness. The laminate may be in circular, strip, or other form. The backing material is secured over the hole or joint, as the case may be, and a small amount of drywall joint compound is added around the perimeter to blend the patch into the wall surface.

European Patent App. No. 0,456,435 A1 to Retti is directed to an apparatus for taping joints between pieces of wallboard comprising a taping head, slidingly contactable with a wall, for substantially simultaneously applying a first layer of a joint compound to a joint between pieces of wallboard, embedding a wallboard tape in the first layer of the joint compound, and overcoating the embedded wallboard tape with at least one additional layer of the joint compound, a handle connected to the taping head, for supporting the taping head, the handle being manually graspable by an operator, the handle having a fluid conduit formed therein for passing joint compound to the taping head, a tape supply mounted on the handle for supplying wallboard tape to the taping head, a backpack, wearable by the operator, for supporting a supply of the joint compound and for producing a pressurized stream of the joint compound, and a flexible connecting means for fluidically interconnecting the backpack and the fluid conduit to pass the pressurized stream of the joint compound from the backpack to the fluid conduit.

U.S. Patent No. 5,628,159 to Younts is directed to an improved joint strip for concealing a joint formed between two panels of adjacent wallboards formed of a flexible support strip capable of withstanding day-to-day wall vibrations and a rib adhered on one side of the support strip such that it extends the length of the support strip. The support strip may be

formed from a variety of materials such as synthetic fibers, cellulose fibers, non-woven paper, plastic fibers, fiberglass, specially treated fabric, and mixtures thereof. The joint strip possesses superior strength and flexibility properties thus eliminating the need to use predecorated wallboard for forming a monolithic appearing wall.

Thus, the prior art described above teaches a combined plastic and tape applicator, a joint structure for plasterboard, a simulated monolithic predecorated wall construction, a laminate and method for drywall holes and joints, a wallboard taping process and apparatus therefor, and a joint strip, method of forming a wall using the joint strip, and wall made therefrom, but does not teach an improved drywall joint construction and method that both minimizes or altogether eliminates the conventional weak, chalky joint compound from the drywall joint, particularly at the joint surface, and provides a stronger, more attractive, and more economical joint. The present invention fulfills these needs and provides further related advantages as described in the following summary.

SUMMARY OF THE INVENTION

The present invention teaches certain benefits in construction and use which give rise to the objectives described below.

The present invention is generally directed to a drywall joint construction and method consisting essentially of a first drywall board having a first lengthwise edge and an outwardly-facing first planar surface, a second drywall board having a second lengthwise edge and an outwardly-facing second planar surface, the second drywall board being positioned adjacent the first drywall board such that the first and second lengthwise edges are brought into substantially abutting contact so as to form a lengthwise crack between the first and second planar surfaces, and a joint finishing system formed within the crack to complete the drywall joint construction. In a first exemplary embodiment, the first and second lengthwise edges of the drywall boards are tapered so as to form the crack as a

channel, wherein the joint finishing system is configured as a taping compound filling the channel and a tape forming the flexible layer and covering the taping compound so as to flush the joint finishing system with the first and second planar surfaces of the abutting drywall boards. In the second and third exemplary embodiments, non-tapered drywall boards are employed such that the crack is formed as a slit. In the second embodiment, the slit is filled with taping compound and a tape again forms the flexible layer covering the taping compound and flushing the joint finishing system with the abutting drywall boards. In the third exemplary embodiment, a flexible compound forms the flexible layer and fills the slit so as to flush the joint finishing system with the drywall boards. Common to each of the three exemplary embodiments, a flexible layer rather than joint cement is employed at the center-line surface of the drywall joint construction, yielding a stronger, more crack-resistant and more aesthetically-pleasing drywall joint construction.

A primary objective of the present invention is to provide a drywall joint construction and method of use of such construction that provides advantages not taught by the prior art.

Another objective is to provide such an invention capable of reducing the amount of joint compound in a drywall joint.

Another objective is to provide such an invention capable of eliminating the conventional joint cement compound at the center-line surface of a drywall joint.

Yet another objective is to provide such an invention capable of eliminating the conventional joint cement compound from the crack of a drywall joint.

A further objective is to provide such an invention capable of eliminating the conventional joint cement compound at the surface of a drywall joint.

A still further objective is to provide such an invention capable of eliminating the conventional joint cement compound from a drywall joint.

Other features and advantages of the present invention will become apparent from the following more detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate the present invention. In such drawings:

Figure 1 is a perspective view of an exemplary embodiment of a drywall joint of the present invention;

Figure 2 is an enlarged cross-sectional view thereof taken along line 2-2 of Figure 1;

Figure 3 is a cross-sectional view of a second exemplary embodiment of a drywall joint of the present invention;

Figure 4 is a cross-sectional view of a third exemplary embodiment of a drywall joint of the present invention; and

Figure 5 is a cross-sectional view of a prior art drywall joint.

DETAILED DESCRIPTION OF THE INVENTION

The above described drawing figures illustrate the invention in at least three of its preferred embodiments, which are further defined in detail in the following description.

The present invention is generally directed to a drywall joint construction **10** consisting essentially of a first drywall board **20** having a first lengthwise edge **22** and an outwardly-facing first planar surface **24**, a second drywall board **30** having a second lengthwise edge **32** and an outwardly-facing second planar surface **34**, the second drywall board **30** being positioned adjacent the first drywall board **20** such that the first and second lengthwise edges **22, 32** are brought into substantially abutting contact so as to form a lengthwise crack **40** between the first and second planar surfaces **24, 34**, and a joint finishing system **50** formed within the crack **40** to complete the drywall joint construction **10**. Common to the joint finishing system **50** in each of the three exemplary embodiments shown and described, no conventional joint cement compound of any kind is employed at the center-line surface **80** of the drywall joint construction **10**. As will be appreciated by those skilled in the art, conventional joint cement compounds are weak and chalky and are prone to cracking along the center-line surface **80** as the first and second drywall boards **20, 30** shift relative to one another, so that, as explained more fully below, by removing the conventional joint cement compound from the center-line surface **80**, a stronger, more aesthetically-pleasing drywall joint construction **10** is obtained. Thus, center-line cracking in the joint cement compound of the conventional drywall joint is eliminated in the present invention by eliminating the joint cement compound from the critical center-line surface **80**. Instead, a flexible layer **60**, preferably of either tape or a flexible compound such as caulk, forms the center-line surface **80**. While this is achieved in at least three ways as disclosed by the exemplary three embodiments, it will be further appreciated that other related joint constructions, involving various drywall board configurations, compounds and flexible outer layers, are possible without departing from the spirit and scope of the present invention.

Turning to Figure 2, in a first exemplary embodiment of the drywall joint construction **10** of the present invention, the first and second drywall boards **20, 30** are shown installed in a substantially co-planar, abutting relationship, as when drywall is installed on an interior wall or ceiling of a building. The abutting first and second lengthwise edges **22, 32** are tapered inwardly from the respective first and second planar surfaces **24, 34** such that the crack is

configured as an outwardly-opening channel **40** having opposite angled channel sides **42, 44**. In this exemplary embodiment, then, the joint finishing system **50** begins with a taping compound **52** that fills the channel **40** so as to cover the channel sides **42, 44**. Next, a flexible drywall tape **60** is installed over the taping compound **52** so as to flush the joint finishing system **50** with the first and second planar surfaces **24, 34**. As the tape **60** is configured with opposite first and second marginal edges **62, 64**, the joint finishing system **50** may further comprise a skim coat **70** applied over the marginal edges **62, 64** so as to blend the tape **60** with the first and second planar surfaces **24, 34**. Importantly, the center-line surface **80** of the joint construction **10**, which is defined as the outwardly-facing surface directly over the channel **40** and which is exposed for later surface treatment, is formed by the tape **60**. No joint compound is at the surface of the joint construction **10** over the channel **40**. As will again be appreciated by those skilled in the art, and as the test data below confirms, a finished drywall joint construction **10** having flexible tape **60** rather than weak, chalky joint cement compound at the center-line surface **80** over the crack **40** between abutting drywall boards **20, 30** produces a joint that is stronger and more crack-resistant. As such, the joint will also be more attractive. In a preferred embodiment, such an improved drywall joint construction **10** may also be achieved more economically than the conventional drywall joint by employing a non-shrinking joint cement formulation as the taping compound **52**, thereby requiring only one coat of the compound before applying the tape **60**. In this way, less material and fewer trips to the work-site may be required, saving on material and labor costs. An exemplary non-shrink taping compound **52** formulation includes 20-25% filler such as calcium carbonate or gypsum, 6-8% lightweight filler such as mica, 10-15% 3M® glass bubble, 1-5% methylcellulose, 10-20% resin and 30-50% water by weight, though any non-shrink compound will be sufficient. By comparison, the conventional joint cement formulation includes 20-25% filler such as calcium carbonate or gypsum, 6-8% lightweight filler such as mica, 5-15% attapulgite or bentonite clay, 1-5% methylcellulose, 5-8% resin and 50-60% water by weight. It will be appreciated by those skilled in the art that the relatively smaller amount of water by percent weight in the exemplary non-shrink formulation results in a taping compound **52** that shrinks relatively

less when setting. It is noted that the use of a non-shrink taping compound **52** as compared to a standard joint cement compound is preferable only in terms of the associated potential material and labor cost savings, but is not necessarily preferable in any respect relating to the functional integrity of the finished drywall joint construction **10**. Rather, the use of one or more coats of conventional joint cement compound or any other suitable material to bring the flexible tape **60** to the center-line surface **80** can be equally effective in the present invention.

Referring to Figure 3, a second exemplary embodiment of the drywall joint construction **10'** of the present invention is shown as again including first and second drywall boards **20'**, **30'** installed in a substantially co-planar, abutting relationship, but now with the respective first and second lengthwise edges **22'**, **32'** being substantially perpendicular to the respective first and second planar surfaces **24'**, **34'** such that the crack between the abutting boards **20'**, **30'** is configured as an outwardly-opening slit **40'**. The joint finishing system **50'** includes a taping compound **52'** filling the slit, which compound may be a conventional joint cement, a non-shrinking joint compound, a flexible compound such as caulk, or any other suitable material. By employing non-tapered drywall boards **20'**, **30'**, it will be appreciated that the total volume to be filled in flushing the joint is greatly reduced as compared to the tapered drywall boards **20**, **30** shown in Figures 1 and 2, making the exemplary joint construction **10'** of Figure 3 even more economical. Regarding the structural integrity of the finished joint, the joint finishing system **50'** further includes a flexible tape **60'** again covering the taping compound **52'** so as to flush the joint finishing system **50'** with the first and second planar surfaces **24'**, **34'**, though a skim coat **70'** may be employed to blend the marginal edges **62'**, **64'** of the tape **60'** with the first and second planar surfaces **24'**, **34'**. Once more, the center-line surface **80'** of the joint construction **10'** is therefore formed by the tape **60'**, not conventional joint cement compound, making the joint stronger and more crack-resistant, as again demonstrated by the test data reported and discussed below.

Turning now to Figure 4, a third exemplary embodiment of the drywall joint construction **10''** of the present invention is shown as including first and second drywall boards **20''**, **30''** installed in a substantially co-planar, abutting relationship and having respective first and second lengthwise edges **22''**, **32''** substantially perpendicular to the respective first and second planar surfaces **24''**, **34''** such that the crack between the abutting boards **20''**, **30''** is again configured as an outwardly-opening slit **40''**. The joint finishing system **50''** comprises a flexible compound **52''** defining the flexible layer **60** (Figure 1) and filling the slit **40''** so as to flush the joint finishing system **50''** with the first and second planar drywall surfaces **24''**, **34''**. So as to more readily flush the flexible compound **52''** with the drywall surfaces **24''**, **34''**, it is preferred that the flexible compound **52''** be of a non-shrink formulation such as a caulk or a compound including 20-25% filler such as calcium carbonate or gypsum, 6-8% lightweight filler such as mica, 10-15% 3M® glass bubble, 1-5% methylcellulose, 30-50% resin and 10-20% water by weight, though, again, any flexible compound will suffice. It will be appreciated by those skilled in the art that by using a flexible compound that is non-shrinking, time and material costs may be saved, but the structural integrity of the finished joint will not be substantially affected. As with the previous two exemplary embodiments of Figures 2 and 3, respectively, the present exemplary embodiment of Figure 4 also has the critical advantage over prior joint systems of employing a flexible layer **60** (Figure 1), here the flexible compound **52''**, at the center-line surface **80''** over the crack **40''** between abutting drywall boards **20''**, **30''**, rather than weak, chalky joint compound, so as to produce a joint construction **10''** that is stronger, more crack-resistant and more attractive.

Samples of both the exemplary three drywall joint constructions of the present invention shown in Figures 2-4 and the conventional drywall joint construction shown in Figure 5 were evaluated for crack-resistance under the test explained below. The conventional joint construction **110**, as shown in Figure 5, includes abutting drywall boards **120**, **130** having tapered first and second lengthwise edges **122**, **132** so as to form a channel **140** that is partially filled in by a first taping coat **152**. A drywall tape **160** is applied over the taping

coat **152**, and then the joint is flushed by one or more topping coats **170** of joint cement over the tape **160**. Thus, it is clear that in the typical prior art drywall joint, joint cement forms the center-line surface **180** directly over the channel **140**. While one topping coat **170** is shown, it is often the case that two topping coats are required to flush the joint, further weakening and adding more labor and material costs to the conventional drywall joint.

In testing the various drywall joint constructions, 12" x 13" pieces of drywall boards were abutted along their finished edges and the joints between the boards were completed according to the three exemplary joint constructions **10**, **10'**, **10''** of the present invention and the conventional drywall joint **110** now used in the art. Each such assembly was laid horizontally on a workstation such that the joint itself was positioned directly over a vertical piston. While the edges of the respective boards opposite the joint were held in place, the piston was caused to gradually force the center of the assembly, or the joint, vertically upward so as to effectively flex or bend the assembly about the joint. Such movement of the piston was allowed to continue until a crack visibly appeared on the surface of the joint. The crack resistance of each joint was then quantified as the change in position of the piston from the joint at rest to the joint at failure, when a crack was observed. Under this test, the conventional drywall joint **110** (Figure 5) failed, or a crack was observed on the joint, at between 4.5 and 5.0 mm. Comparatively, in the first exemplary joint construction **10** of the present invention (Figure 2), no crack was seen until between 29.0 and 31.0 mm. And in the second exemplary joint construction **10'** (Figure 3), no crack was visible until the joint was flexed to between 42.0 and 43.5 mm from its unflexed starting position, indicating that eliminating more of the joint cement by replacing the conventional tapered drywall boards **20**, **30** (Figure 2) with non-tapered boards **20'**, **30'**, and thus constituting more of the joint system **50'** with drywall board rather than with joint cement, further improved the strength and crack-resistance of the joint. In both of the first two embodiments of the joint construction **10**, **10'**, the crack that was observed was in the skim coat **70**, **70'** used to blend the marginal edges **62**, **64**, **62'**, **64'** of the tape **60**, **60'** with the respective planar drywall board surfaces **24**, **34**, **24'**, **34'**, not along the center-line surface **80**, **80'** in the tape **60**, **60'**.

For the third exemplary joint construction **10''** (Figure 4), wherein no joint cement is used at all, the first crack was seen at between 210.0 and 220.0 mm, evidencing that ridding the joint construction **10''** of joint cement altogether produces the strongest, most crack-resistant joint. While no joint should be expected to see in normal use the kind of movement or flexure indicated, this testing still provides a striking comparison of the crack-resistance of the joint constructions **10, 10', 10''** of the present invention relative to a conventional drywall joint **110**. Comparatively, the testing proves that all three exemplary embodiments of the present invention wherein the joint cement is at least eliminated from the center-line surface of the joint yielded significant improvements in crack-resistance over the conventional prior art drywall joint **110**.

It follows that by removing the conventional joint cement compound from the center-line surfaces **80, 80', 80''** of the drywall joint constructions **10, 10', 10''** according to the present invention, a stronger, more crack-resistant joint is achieved. Generally, both drywall tape and drywall board are over 300% stronger than the typical joint cement, and flexible compounds such as caulks can be even stronger. Thus, though it has generally always been thought in the art that the joint cement is the strongest part of the joint system, this is simply not the case, as the above test data indicates. In fact, the typical joint cement is actually designed to be weak and chalky so that it can be easily sanded down to bring it flush with the abutting drywall boards. These same attributes cause the joint cement to be prone to cracking. The present invention takes advantage of a correct understanding of the relative strengths of the components of the typical drywall joint to beneficially remove the joint cement from the center-line surface of the joint construction, and in two constructions **10', 10''** effectively remove the joint cement from the joint system **50', 50''** altogether, so as to produce an improved, stronger and more crack-resistant drywall joint construction.

Moreover, the problem of surface cracking, which makes a drywall joint unsightly and costly to repair, is effectively eliminated by the joint constructions **10, 10', 10''** of the present invention. While having the soft and weak joint cement at the surface of a drywall joint

directly over the recess or crack between abutting drywall boards allows center-line cracking to often occur along the recess as the joint is stressed and the drywall boards move relative to one another, the joint constructions **10, 10', 10''** of the present invention are stronger and greatly reduce the risk of such surface cracking by entirely removing the joint cement from the center-line surface **80, 80', 80''**. Further, as is known in the art, the conventional joint cement compound at the surface of the typical drywall joint **110** also tends to absorb too much paint so as to leave different sheens on the wall or ceiling, commonly referred to as flashing or photographing. The joint constructions **10, 10', 10''** of the present invention eliminate this problem as well, again, by entirely removing the absorptive joint cement from the center-line surface **80, 80', 80''**. The risk of delamination between the drywall board, texture and paint possible in the conventional drywall joint **110** employing joint cement **170** at the surface **180** is also effectively eliminated in the joint constructions **10, 10', 10''** of the present invention. And regarding the aesthetics of the drywall joint, it is preferred, though not necessary in practicing the present invention, that an elastomeric paint (not shown) be employed in covering the joint that has a crack resistance equal to or exceeding that of the joint, or that has a flexibility or elongation meeting or exceeding that of the respective joint construction. In this way, the paint would be unlikely to crack before the joint ever would.

Beyond these structural and aesthetic considerations, those skilled in the art will appreciate that the joint constructions **10, 10', 10''** of the present invention also provide economic benefits over the conventional drywall joint **110**. As seen, even in the first and second exemplary joint constructions **10, 10'** wherein a taping compound **52, 52'** is used to fill in the space **40, 40'** between abutting drywall boards **20, 30, 20', 30'**, because only one taping coat **52, 52'** and a thin skim coat **70, 70'** are generally required to complete the joint finishing system **50, 50'**, as compared to the usual taping coat **152** and two topping coats **170** required in the conventional drywall joint **110**, savings in time and material costs are gained. Moreover, when non-tapered drywall boards **20', 30', 20'', 30''** are employed, as in the second and third joint constructions **10', 10''** of the present invention, the space **40', 40''** to be filled in is reduced, thereby reducing the materials required and, accordingly, the labor

needed to install the materials. In the third exemplary joint construction **10''**, the elimination of the drywall tape and drywall joint compound altogether provides even further savings in terms of both materials and labor.

Therefore, the present invention of an improved drywall joint construction and method both minimizes or altogether eliminates the conventional weak, chalky joint cement compound from the drywall joint, particularly at the joint surface where cracking is most likely and most detrimental, and provides a stronger, more attractive, and more economical joint. While the invention has been described with reference to at least three preferred embodiments, it is to be clearly understood by those skilled in the art that the invention is not limited thereto. Rather, the scope of the invention is to be interpreted only in conjunction with the appended claims and it is made clear, here, that the inventor believes that the claimed subject matter is the invention.